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FORAGE HABITS OF MULE DEER DURING THE LATE FALL AS MEASURED BY STOMACH CONTENT ANALYSES

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A knowledge of seasonal food habits of grazing animals is necessary for managing any range whether it is grazed by one class of animal or several. On Utah's foothill and mountain ranges--grazed by both deer and livestock, often in excess of the forage supply--such knowledge is especially important as a basis for bringing about sound multiple-use management. It is essential to understand not only the forage preferred by both kinds of animals at different times of the year, but how forage uses are related to each other. This note reports on one phase--food habits of deer in the late fall--of current food habit studies which form a part of a broader investigation designed to determine big game-livestock range relationships in Utah.1/

Utilization of forage by deer late in the fall is difficult to determine by direct methods of measuring vegetation because most forage plants have either shattered or shed their leaves. Stomach content analyses provide valuable data on the diet of deer during this season of the year. Although such analyses may not be entirely accurate quantitatively since some plants remain undigested longer than others, they do bring out some important information about the food habits of deer that are difficult to determine otherwise.

Samples from stomachs of 88 mule deer were collected during the hunting season for the period 1948-51 on various range types in central and southeastern Utah. This was done by the author and other range and wildlife technicians on three hunting units--Monroe Mountain and Oak Creek on the Fishlake and Elk Ridge on the Manti-LaSal National Forest.

1/ This study was conducted as part of the Utah Cooperative Big Game, Livestock, and Range Relationship Research Project. Cooperating in the project are: the Utah State Fish and Game Commission, U. S. Fish and Wildlife Service, Utah State Agricultural College, and the U. S. Forest Service.

Methods of Study

Stomach samples were taken as soon after the kill as possible. Each paunch was divided roughly into four quarters. Four portions were taken from various parts of each quarter and combined to form a composite sample ranging between one pint and one quart in volume. It was then washed and preserved in a 10-percent solution of formaldehyde. In the laboratory each sample was washed and mixed thoroughly. One pint (1/2 pint for fawns) of this mixture was analyzed as follows: The finer particles were strained through a 12-mesh sieve and discarded. From the remainder all identifiable material was separated by species, with the aid of a dissecting microscope when necessary. The percentage of each species in relation to the total identifiable material was then estimated on a volume basis. Forbs and grasses are not reported by species because of the relative unimportance of individual species when averaged by types. The portion of the whole sample that could not be identified (on the average about 20 percent) was not included in the data, since it did not vary materially between types.

Results and Discussion

The results of the stomach sample analyses are presented in table 1 in terms of averages for seven range types. As this table shows. browse made up the greatest part of the identifiable material in all range types, although there was considerable variation in the species consumed even where types were similar. This confirms other estimates, based on vegetal measurement, which indicate that browse is increasingly used in the fall as forbs become dry.

Fallen aspen leaves and Oregon grape (Mahonia repens) formed the major part of the browse deer forage in fall on the high mountain ranges of the study areas where they were present. Oregon grape was apparently preferred over other species. Where plentiful it formed the major portion of deer stomach samples even to the point of supplanting aspen leaves in the diet. Snowberry (Symphoricarpos oreophilus), although abundant in many areas was present in only about half of the samples and in small amounts. Others such as silver sagebrush (Artemisia cana) and manzanita (Arctostaphylos patula) were likewise found only in small amounts even when they were locally plentiful. Coniferous foliage was present in practically all samples but usually in small quantities.

Curlleaf and true (birchleaf) mountain-mahoganies, (Cercocarpus ledifolius and C. montanus), bitterbrush (Purshia tridentata), and boxleaf myrtle (Pachistima myrsinites) made up only small percentages of the average stomach content in most types due to their scarcity or scattered occurrence. Ordinarily, however, these species show heavy fall utilization by deer and where they were available in sufficient quantity they formed large percentages of the stomach content in individual samples. Certain shrubs such as Oregon grape, boxleaf myrtle, and curlleaf mountain-mahogany which are usually grazed but little earlier in the year become the most preferred late fall deer forages. This is especially true of

Table 1.--Stomach content of mule deer on various range types in central Utah, October 20 to November 3, 1948-51[1] (based on samples from 88 stomachs)

Class of forage and species	Range type: Spruce-fir[2]	Aspen-spruce-fir[2]	Aspen-mountain brush[2]	Ponderosa pine-oak-aspen[3]	Mountain brush[2]	Mountain brush[4]	Pinyon-juniper[3]
			Percent of identifiable material				
Browse:							
Fallen aspen leaves	50.9(1)	28.4(1)	67.3(1)	27.4(2)	1.6(3)	--	--
Oregon grape	9.8(3)	43.3(1)	3.2(3)	29.4(2)	29.7(2)	7.8(3)	1.5(3)
Silver sagebrush	3.0(3)	3.0(3)	.2(3)	--	--	--	--
Sagebrush (other)	--	.4(3)	--	3.7(1)	.9(1)	1.1(1)	45.2(1)
Snowberry	.7(1)	1.2(1)	.8(1)	1.2(2)	.3(1)	.1(3)	--
Rabbitbrush	--	1.4(3)	--	--	4.4(2)	.1(2)	--
Manzanita	--	--	--	.7(3)	--	1.8(3)	9.3(3)
Gambel oak	--	4.4(3)	--	7.7(1)	11.4(1)	49.7(1)	5.7(3)
Curlleaf mountain-mahogany	--	.1(3)	--	--	22.2(2)	6.9(3)	--
True mountain-mahogany	--	.6(3)	--	--	5.8(3)	.3(3)	27.2(2)
Bitterbrush	--	.2(3)	--	1.5(3)	3.5(3)	4.8(2)	1.1(3)
Boxleaf myrtle	--	T(3)	--	.4(3)	15.7(2)	1.7(3)	.4(3)
Coniferous foliage	3.9(1)	5.6(1)	4.2(1)	6.4(1)	.2(1)	.2(1)	1.1(1)
Other	.1	.8	2.5	--	1.4	3.5	2.3
Total browse	68.4	89.4	78.2	78.4	97.1	78.0	93.8
Forbs:	28.1(2)	7.7(1)	20.6(2)	1.8(3)	1.7(3)	7.3(3)	.4(3)
Grasses:	3.5(1)	2.9(1)	1.2(1)	19.8(1)	1.2(1)	14.7(1)	5.8(3)
No. stomachs analyzed	11	22	5	15	7	18	10

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[1] Figures in parentheses indicate availability: (1) plentiful, (2) common but distribution or amount limited, and (3) scarce or of only spotty occurrence.

[2] Monroe Mountain and adjacent range.

[3] Elk Ridge

[4] Oak Creek

Oregon grape which shows practically no visible utilization until September but in this study made up the bulk of deer stomach contents wherever sufficiently available.

Sagebrush (Artemisia tridentata) is little used by deer in summer. Light use begins in fall and increases as the winter progresses. In only one type, pinyon-juniper of Elk Ridge, was use of sagebrush shown to be heavy. Here, an overpopulation of deer and extremely heavy use by cattle have depleted the vegetation so that sagebrush, juniper (Juniperus utahensis), and pinyon (Pinus edulis) were about the only forage plants available. Some samples contained as much as 80 percent sagebrush. Deer were thus making serious inroads on their supply of forage in late October on this winter range.

Although forbs are especially important in summer those that remain semi-green and do not shatter badly, such as lupine (Lupinus spp.) and tall larkspur (Delphinium barbeyi), may also form important parts of the fall diet. On areas where such forbs were plentiful they commonly totaled 35 to 45 percent of the stomach contents even where other forage such as fallen aspen leaves was also plentiful. Some species of lupine show little summer use but are closely cropped by deer in fall. Further evidence of deer utilization of forbs at this season is indicated by the presence of deer tracks leading from clump to clump of many of the taller forbs after fresh snowfalls. Such use (for example the use of mullein on old burns) may often be due to a shortage of better forage.

Green grass, although usually making up only a small percentage of the average diet, was found in small amounts in all samples. In a few individual samples grass constituted 30 to 65 percent of the identifiable material. Such exceptions are believed to be the result of feeding in small wet bluegrass meadows or around water where grass was green and succulent and not to a shortage of other forage. In only one type--ponderosa pine-oak-aspen on Elk Ridge--did green grass make up a substantial part of most of the stomach samples. Shortages of desirable browse and forbs may account for greater use of grass here.

This study confirms previous observations that the late fall diet of deer differs considerably from their summer and early fall diet. Utilization studies on Monroe Mountain and adjacent summer range have shown that forbs were far more important than browse as summer deer forage until about mid-August.2/ Browse species contributing most to the summer and early fall deer diet on this range were aspen, chokecherry (Prunus melanocarpa), oak (Quercus gambeli), elderberry (Sambucus spp.), and snowberry, of which the only major late fall forage species is aspen. Aspen leaves, which otherwise might be consumed earlier, are not available to deer until they drop. Much of the highly preferred fall browse

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2/ Smith, Justin G. Food habits of mule deer in Utah. Jour. Wildlife Management. (In press.)